CURRENT LITERATURE

BOOK REVIEWS

Ecology of tide lands

There is no place more suitable for the study of dynamic ecology than in areas swept over by the tides, and there is no one better able to write on the problems of such areas than Professor OLIVER.[1] For years he and his students have attacked seashore problems, first on the coast of Brittany, and more recently on the coast of Norfolk. The Bouche d'Erquy and Blakeney are household words to all students of shore ecology. The main results of OLIVER'S studies are now incorporated in book form, and, quite in the spirit of the time, he has become associated with an engineer, who presents the practical application of ecological principles to engineering problems along shore; the result is a masterpiece of applied ecology.

The first chapters deal with tide and current data, the tidal compartments of rivers, and the foreshore. That the problem is one of no mean importance is shown by the fact that in the British Isles there are 8000 miles of shore line and 11,000 miles of river front at high water; and there are 1250 square miles of area between tides. OLIVER'S greatest contribution is in chapters iv–vii, which deal with the function of vegetation, sand dunes and their fixation, and shingle beaches and their fixation. The fundamental importance of plants in the stabilization of shore lines has been inadequately realized by engineers, although sporadic and often ineffectual planting of sand dunes has been more or less indulged in for a century. A perusal of this work makes it clear that ecology must form a large part of the education of an engineer who really wishes to get at the foundations of shore problems. So far as dunes are concerned, Britain's problem is not as great as that of Gascony and other continental tracts. The most satisfactory plant for dune fixation is *Psamma* (*Ammophila*), although *Elymus arenarius*, *Carex arenaria*, and other species may also be used. Even lichens and mosses have a fixative value. The chief factor in dune fixation lies in the development of an effective foredune.

One of the striking features of British shores is the shingle beach, where cobblestones are piled up by vigorous wave movement. At Dungeness the shingle covers 10,000 acres. At Blakeney on the Norfolk coast the shingle is piled up to a height of 10 feet above high water, and at Chesil on the Atlantic shore, the height is 30 feet. Shingle is kept mobile (1) by wave impact and

[1] CAREY, A. E., and OLIVER, F. W., Tidal lands; a study of shore problems. 8vo. pp. 284. *pls. 29. figs. 54.* London: Blackie & Son. 1918.

throw, resulting in a talus or fan on the lee side, (2) by percolation, especially where there is large tidal difference, or (3) by stream scour on the lee side. *Suaeda fruticosa* is able to colonize upward growing shingle, quite as *Psamma* may colonize an upward growing dune; *Suaeda* is an especially good pioneer, because of its halophytic proclivities. Later stages, as shingle growth decreases, are characterized by mat plants such as *Silene maritima* and *Convolvulus Soldanella*. A plant of the latter increased in area within four years from 9 to 525 square feet.

An interesting chapter deals with the reclamation of salt marshes. It is OLIVER'S view that a marsh would not fill alone by silting, by reason of alternate filling and cutting. Reclamation may be brought about naturally by coastal elevation or by the building up of a barrier dune, or it may be brought about by artificial agencies. A remarkably effective plant reclaimer of halophytic shores is *Spartina Townsendii*, a supposed natural hybrid of *S. stricta* and *S. alterniflora*. This species was first noted at Southampton in 1870, and now covers thousands of acres. In 1895 it appeared at Bayonne, on the Bay of Biscay. It is interesting to note that these two areas are the only ones known where the areas of the supposed parent species overlap. —H. C. COWLES.

NOTES FOR STUDENTS

Root systems.—Since the notable work of CANNON in 1911 on the roots of desert plants, nothing has contributed so much to our knowledge of subterranean plant organs as the recent publication by WEAVER,[2] in which he has described the root systems of some 140 species of shrubs and herbs from the prairies of Nebraska and Washington, the plains and sand hills of Colorado, and some gravel slide and forest communities of the Rocky Mountains of Colorado. For each of the habitats under investigation many data regarding such environmental conditions as rainfall, evaporation, and soil moisture are given. These data and the abundance of illustrative drawings and photographs of excavated root systems are among the most valuable features of the report.

In the Nebraska prairie there is a striking individuality in the root systems, and a grouping of the roots into more or less definite absorbing layers, thus reducing competition and permitting the growth of a larger number of species. The deeper rooted species comprise 55 per cent of the 33 species examined, and extend beyond a depth of 5 feet, some reaching as much as 20 feet below the surface, many of them having few or no absorbing roots in the first few feet of soil. The majority of the deeply rooted species are dicotyledons; but it is notable that the group also includes three dominant grasses, *Panicum virgatum*, *Andropogon furcatus*, and *Agropyron repens*. In contrast

[2] WEAVER, J. E., The ecological relations of roots. Carnegie Inst. Wash. Publ. 286. pp. vii+128. *pls. 33. figs. 58.* 1919.